

WHAT I CLAIM ARE:

1. A MOS-type solid-state image pickup device, comprising:
 - a semiconductor substrate;
 - a large number of pixels arranged in one surface of said
- 5 semiconductor substrate in an array having a plurality of rows and a plurality of columns, each said pixel includes (a) a photoelectric converter element and (b) a switching circuit electrically connected to said photoelectric converter element for controlling generation of an output signal representing electric charge accumulated in said photoelectric converter element and discharge of
- 10 the electric charge;
 - a row selection signal line disposed for each pixel row and being electrically connected to associated switching circuits, each said row selection signal line receiving a row selection signal for controlling the generation of the output signal;
- 15 a plurality of output signal lines each of which being associated with at least one pixel column and receiving the output signal from associated switching circuits;
 - a reset signal line disposed for each said pixel row and being electrically connected to associated switching circuits, each said reset signal
- 20 line receiving a reset signal for controlling the discharge of the electric charge; and
 - an overall reset controller for supplying the reset signal to said reset signal lines at a time.
2. A MOS-type solid-state image pickup device according to claim 1, wherein
- 25 each said switching circuit comprises:
 - an output transistor including a control terminal electrically connected

to said photoelectric converter element for generating the output signal;

a row selection transistor electrically connected in series to said output transistor, said row selection transistor including a control terminal electrically connected to said row selection signal line; and

5 a reset transistor electrically connected to said photoelectric converter element, said reset transistor including a control terminal electrically connected to said reset signal line.

3. A MOS-type solid-state image pickup device according to claim 2, further comprising a plurality of constant-voltage supply lines extending in a direction
10 of said pixel column or row for receiving a constant voltage,

each said pixel column or row being associated with one of said constant-voltage supply lines,

each said constant-voltage supply line being electrically connected to said output transistors and said reset transistors in said associated pixel
15 column or row.

4. A MOS-type solid-state image pickup device according to claim 1, further comprising:

a readout row-shifter for sequentially supplying the row selection signal to said row selection signal lines;

20 a reset row-shifter for sequentially supplying the reset signal to said reset signal lines; and

an image signal outputting device electrically connected to said output signal lines for generating an image signal representing the output signal and for sequentially outputting the image signal.

25 5. A MOS-type solid-state image pickup device according to claim 4, wherein said image signal outputting device comprising:

an analog signal generator for converting the output signal generated on each said output signal line into an analog voltage signal; and

a row-directional shifter for controlling operation of said analog signal generator and for being sequentially outputted the analog voltage signal from

5 said analog signal generator.

6. A MOS-type solid-state image pickup device according to claim 4, wherein said image signal outputting device comprising:

an analog signal generator for converting the output signal generated on each said output signal line into an analog voltage signal; and

10 an analog-to-digital converter for receiving the analog voltage signal and for converting the analog voltage signal into a digital signal; and

a buffer memory for receiving the digital signal, temporarily keeping the digital signal therein, and outputting the digital signal therefrom.

7. A MOS-type solid-state image pickup device according to claim 4, further

15 comprising a controller for controlling operations of said overall reset controller, said readout row-shifter, said reset row-shifter, and said image signal

outputting device.

8. A MOS-type solid-state image pickup device according to claim 2, further comprising:

20 a transfer signal line disposed for each said pixel row and being electrically connected to associated switching circuits; and

a transfer control row-shifter for sequentially supplying a transfer control signal controlling the generation or the discharge of the output signal to said transfer signal lines, and

25 each said switching circuit further comprises a charge transfer transistor electrically connected to said photoelectric converter element, said

output transistor, and said reset transistor, said charge transfer transistor including a control terminal electrically connected to said transfer signal line.

9. A MOS-type solid-state image pickup device according to claim 8, further comprising a plurality of constant-voltage supply lines extending in a direction

5 of said pixel column or row for receiving a constant voltage,

each said pixel column or row being associated with one of said constant-voltage supply lines,

each said constant-voltage supply line being electrically connected to said output transistors, said reset transistors and said charge transfer transistor

10 in said associated pixel column or row.

10. A MOS-type solid-state image pickup device according to claim 8, further comprising:

a readout row-shifter for sequentially supplying the row selection signal to said row selection signal lines;

15 a reset row-shifter for sequentially supplying the reset signal to said reset signal lines;

a transfer control row-shifter for sequentially supplying the transfer control signal to said transfer signal lines; and

20 an image signal outputting device electrically connected to said output signal lines for generating an image signal representing the output signal and for sequentially outputting the image signal.

11. A MOS-type solid-state image pickup device according to claim 10, wherein said image signal outputting device comprising:

25 an analog signal generator for converting the output signal generated on each said output signal line into an analog voltage signal; and

a row-directional shifter for controlling operation of said analog signal

generator and for being sequentially outputted the analog voltage signal from said analog signal generator.

12. A MOS-type solid-state image pickup device according to claim 10, wherein said image signal outputting device comprising:

- 5 an analog signal generator for converting the output signal generated on each said output signal line into an analog voltage signal; and
- an analog-to-digital converter for receiving the analog voltage signal and for converting the analog voltage signal into a digital signal; and
- a buffer memory for receiving the digital signal, temporarily keeping the
- 10 digital signal therein, and outputting the digital signal therefrom.

13. A MOS-type solid-state image pickup device according to claim 10, further comprising a controller for controlling operations of said overall reset controller, said readout row-shifter, said reset row-shifter, said transfer control row-shifter, and said image signal outputting device.

15 14. A digital camera, comprising:

- a MOS-type solid-state image pickup device, comprising: (i) a semiconductor substrate; (ii) a large number of pixels arranged in one surface of said semiconductor substrate in an array having a plurality of rows and a plurality of columns, each said pixel includes (a) a photoelectric converter
- 20 element and (b) a switching circuit electrically connected to said photoelectric converter element for controlling generation of an output signal representing electric charge accumulated in said photoelectric converter element and discharge of the electric charge; (iii) a row selection signal line disposed for
- each pixel row and being electrically connected to associated switching circuits,
- 25 each said row selection signal line receiving a row selection signal for controlling the generation of the output signal; (iv) a plurality of output signal

lines each of which being associated with at least one pixel column and receiving the output signal from associated switching circuits; (v) a reset signal line disposed for each said pixel row and being electrically connected to associated switching circuits, each said reset signal line receiving a reset

5 signal for controlling the discharge of the electric charge; (vi) a readout row-shifter for sequentially supplying the row selection signal to said row selection signal lines; (vii) a reset row-shifter for sequentially supplying the reset signal to said reset signal lines; (viii) an overall reset controller for supplying the reset signal to said reset signal lines at a time; and (ix) an image

10 signal outputting device electrically connected to said output signal lines for generating an image signal representing the output signal and for sequentially outputting the image signal;

an image signal processor for generating mobile picture data or still picture data using the image signal outputted from said MOS-type solid-state

15 image pickup device;

a light shielding device for interrupting light incident to said MOS-type solid-state image pickup device;

a still picture indication signal generator for generating a still picture indication signal indicating shooting of a still picture;

20 a mobile picture mode controller electrically connected to said MOS-type solid-state image pickup device for continually control operation thereof for repeatedly conducting (a) an image readout operation in which the row selection signal is sequentially supplied from said readout row-shifter to a predetermined number of row selection signal lines for sequentially outputting

25 from said image signal outputting device an image signal representing the output signal generated on each said output signal line and (b) an electronic

shutter operation in which the reset signal is sequentially supplied from said reset row-shifter to said reset signal supply lines at least associated with said pixel row as an object of the image signal readout operation for sequentially discharge electric charge accumulated in said photoelectric converter

5 elements; and

a first still picture mode controller electrically connected to said MOS-type solid-state image pickup device for controlling in place of said mobile mode controller, when the still picture indication signal is outputted, operations of said MOS-type solid-state image pickup device and said light shielding device, for conducting an overall reset operation in which the overall
10 reset controller is operated, in a state in which the operations of said readout row-shifter and said rest row-shifter are stopped, and electric charge accumulated in all said photoelectric converter elements is discharged, and for conducting an image signal readout operation in which said light shielding
15 device is operated and interrupts the incident light for a predetermined period of time after the overall reset operation is finished, and the row selection signal is sequentially supplied from said readout row-shifter to said row selection signal lines for sequentially outputting an image signal representing the output signal generated on said output signal lines from said image signal outputting
20 device.

15. A digital camera according to claim 14, wherein:

when an electronic shutter operation or an image signal readout operation is being executed at a point of time when the still picture indication signal is outputted, said first still picture mode controller does not interrupt the
25 operation; and when an electronic shutter operation is being executed at a point of time when the still picture indication signal is outputted, said first still

picture mode controller conducts once the image signal readout operation after the electronic shutter operation; and then the first still picture mode controller conducts the overall reset operation.

16. A digital camera according to claim 14, wherein

5 said MOS-type solid-state image pickup device, further comprising:

a transfer signal line disposed for each said pixel row and being electrically connected to associated switching circuits; and

a transfer control row-shifter for sequentially supplying a transfer control signal controlling the generation or the discharge of the output signal to

10 said transfer signal lines, and

each said switching circuit further comprises a charge transfer transistor electrically connected to said photoelectric converter element, said output transistor, and said reset transistor, said charge transfer transistor including a control terminal electrically connected to said transfer signal line,

15 said mobile picture mode controller or said first still picture mode controller conducting said transfer control row-shifter for sequentially supplying, in the image readout operation, the row reset operation, or the overall reset operation, the transfer control signal to each said transfer signal lines associated with said pixel row as an object of the operation.

20 17. A digital camera according to claim 14, further comprising:

a strobe device for emitting flash light when a predetermined signal is received or said strobe device installing device for installing therein;

a second still picture mode controller electrically connected to said MOS-type solid-state image pickup device for controlling in place of said
25 mobile mode controller, when the still picture indication signal is outputted, operations of said MOS-type solid-state image pickup device and said light

shielding device, for conducting an overall reset operation in which the overall reset controller is operated, in a state in which the operations of said readout row-shifter and said rest row-shifter are stopped, and electric charge accumulated in all said photoelectric converter elements is discharged, and for

- 5 conducting an image signal readout operation in which after the overall reset operation is finished, a strobe device operation signal is generated for operating said strobe device; said light shielding device is operated and interrupts the incident light for a predetermined period of time after strobe device operation signal is generated; and the row selection signal is
- 10 sequentially supplied from said readout row-shifter to said row selection signal lines for sequentially outputting an image signal representing the output signal generated on said output signal lines from said image signal outputting device; and

- a still picture mode specifying device for beforehand specifying a still
- 15 picture mode controller to be operate when the still picture indication signal is outputted.

18. A digital camera according to claim 17, wherein:

- when an electronic shutter operation or an image signal readout operation is being executed at a point of time when the still picture indication
- 20 signal is outputted, said second still picture mode controller does not interrupt the operation; and when an electronic shutter operation is being executed at a point of time when the still picture indication signal is outputted, said second still picture mode controller conducts once the image signal readout operation after the electronic shutter operation; and then the second still picture mode
- 25 controller conducts the overall reset operation.

19. A digital camera according to claim 17, wherein

said MOS-type solid-state image pickup device, further comprising:

a transfer signal line disposed for each said pixel row and being electrically connected to associated switching circuits; and

a transfer control row-shifter for sequentially supplying a transfer

5 control signal controlling the generation or the discharge of the output signal to said transfer signal lines, and

each said switching circuit further comprises a charge transfer transistor electrically connected to said photoelectric converter element, said output transistor, and said reset transistor, said charge transfer transistor

10 including a control terminal electrically connected to said transfer signal line,

said mobile picture mode controller, said first still picture mode controller or said second still picture mode controller conducting said transfer control row-shifter for sequentially supplying, in the image readout operation, the row reset operation, or the overall reset operation, the transfer control

15 signal to each said transfer signal lines associated with said pixel row as an object of the operation.